

TECHNICAL DATASHEET

Absolute Encoders AC 58 - BiSS / SSI



- Compact design: 50 mm length for single or multiturn
- Aids for start up and operation: diagnostic LED, preset key with optical response, status information
- Use of sine/ cosine signals for fast control task possible
- Control input: Direction
- Resolution up to 29 Bit



TECHNICAL DATA mechanical

Housing diameter	58 mm
Shaft diameter	6 mm / 10 mm (Solid shaft) 10 mm / 12 mm (Hub shaft)
Flange (Mounting of housing)	Synchro flange, Clamping flange, Tether, Square flange
Protection class shaft input (EN 60529)	IP64 or IP67
Protection class housing (EN 60529)	IP64 or IP67
Shaft load axial / radial	40 N / 60 N
Axial endplay of mounting shaft (hubshaft)	± 1.5 mm
Radial runout of mating shaft (hubshaft)	± 0.2 mm
Max. speed	max. 10 000 rpm (continuous), max. 12 000 rpm (short term)
Torque	0.01 Ncm
Moment of inertia	ca. 3.8×10^{-6} kgm ²
Vibration resistance (DIN EN 60068-2-6)	100 m/s ² (10 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	1000 m/s ² (6 ms)
Operating temperature	-40 °C ... +100 °C
Storage temperature ¹	-25 °C ... +85 °C
Weight	approx. 260 g (ST) / 310 g (MT)
Connection	Cable, axial or radial M23 connector (Conin), 12 pole, axial or radial M12-connector, 8 pole, axial or radial

¹ due to packaging

TECHNICAL DATA electrical

Supply voltage	± 10% DC 5 V or DC 10 - 30 V
Max. current w/o load	50 mA (ST), 100 mA (MT)
Resolution singleturn	10 - 17 Bit Gray Excess: 360, 720 increments
Resolution multiturn	12 Bit
Output code	Binary, Gray
Drives	Clock and Data / RS422

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TECHNICAL DATA electrical (continued)

Linearity	$\pm \frac{1}{2}$ LSB (± 1 LSB for resolution > 13 Bit)
Incremental signals optional	Sinus-Cosinus 1 Vpp
Number of pulses	2048
3dB limiting frequency	500 kHz
Absolute accuracy	$\pm 35''$
Repeatability	$\pm 7''$
Parametrization	Code type, Direction, Warning, Alarm
Control inputs	Direction
Reset key	Disable via parameterization
Alarm output	Alarm bit (SSI Option), warning and alarm bit (BiSS)
Status LED	Green = ok, red = alarm

RECOMMENDED DATA TRANSFER RATE bei SSI

The max. data transfer rate depends on the cable length. For Clock / $\overline{\text{Clock}}$ and Data / $\overline{\text{Data}}$ please use twisted pairs. Use shielded cable.

Cable length	Frequency
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

DATA FORMAT Singleturn

Resolution	Data Bits										
	T1 ... T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
9 Bit ¹	S8 ... S0	0	0	0	0	0	W ²				
10 Bit ¹	S9 ... S1	S0	0	0	0	0	W ²				
11 Bit ¹	S10 ... S2	S1	S0	0	0	0	W ²				
12 Bit ¹	S11 ... S3	S2	S1	S0	0	0	W ²				
13 Bit ¹	S12 ... S4	S3	S2	S1	S0	0	W ²				
14 Bit ¹	S13 ... S5	S4	S3	S2	S1	S0	0	W ²			
15 Bit ¹	S14 ... S6	S5	S4	S3	S2	S1	S0	0	W ²		
16 Bit ¹	S15 ... S7	S6	S5	S4	S3	S2	S1	S0	0	W ²	
17 Bit ¹	S16 ... S8	S7	S6	S5	S4	S3	S2	S1	S0	0	W ²

Examples for data format 9 Bit and 13 Bit with the optional bits alarm und parity

Resolution	Data Bits										
	T1 ... T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
9 Bit + P ³	S8 ... S0	0	0	0	P	0	W ²				
9 Bit + A ⁴	S8 ... S0	0	0	0	A	0	W ²				
9 Bit + P ³ + A ⁴	S8 ... S0	0	0	0	A	P	0	W ²			
9 Bit + P ³	S12 ... S4	S3	S2	S1	S0	P	0	W ²			
9 Bit + A ⁴	S12 ... S4	S3	S2	S1	S0	A	0	W ²			
9 Bit + P ³ + A ⁴	S12 ... S4	S3	S2	S1	S0	A	P	0	W ²		

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DATA FORMAT Multiturn

Resolution	Data bits										
	T1 ... T12	T13 ... T21	T22	T23	T24	T25					
24 Bit ¹	M11 ... M0	S11 ... S2	S1	S0	0	W ²					
25 Bit ¹	M11 ... M0	S12 ... S3	S2	S1	S0	0	W ²				
26 Bit ¹	M11 ... M0	S13 ... S4	S3	S2	S1	S0	0	W ²			

Example for data format 24 Bit with the optional bits alarm und parity

24 Bit + P ³	M11 ... M0	S11 ... S2	S1	S0	P	0	W ²				
24 Bit + A ⁴	M11 ... M0	S11 ... S2	S1	S0	A	0	W ²				
24 Bit + P ³ + A ⁴	M11 ... M0	S11 ... S2	S1	S0	A	P	0	W ²			

S0 ... S16 Data bits for resolution per revolution

M0 ... M11 Data bits for number of revolutions (only for multiturn)

¹ Options (Parity bit, alarm and parity bit, zero bit) on request

²W: from this data bit on the data iteration for multiplex starts

³Parity bit: Even Parity (The parity bit expands the data bits to an even number of 1-bits).
(Option)

⁴Alarm bit: is set to "1" when over temperature, under temperature, disc breakage and defect LED

SYNCHRONOUS-SERIAL TRANSFER (SSI)

Synchronous readout of the encoder data is according to the clock rate given by the SSI-counterpart.

The number of clock rates is determined by the type of encoder (singleturn resp. multiturn) and the configuration of the special Bits as defined.

For multiple transactions (the stored value is readout several times successively) a fixed clock rate per transaction must be kept (for singleturn 13 resp. 14 clocks, for multiturn 25 resp. 26 clocks).

- In the rest position, when the last clock brush has passed by more than 30µs, the data output is logically at "1".
- With the first descending clock edge the encoder data and the special bits are

loaded in the shift register of the encoder interface.

- With each ascending clock edge the data bits are serially readout, beginning with the MSB.
- At the end of the data transfer the data output is set to logically "0" for approx. 20µs. If within these 20µs a further clock brush reaches the encoder interface, the already transferred data is readout once again. This multiple transfer of the same data makes it possible to recognize transfer errors.
- After the 20µs the data output goes to its rest position, logically "1". Subsequently new encoder data can be readout.

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ELECTRICAL CONNECTIONS

M23 connector (Conin), 12 pole / cable
Interface BI, SB, SG

Cable	M23 (Conin)	Signal
brown ³	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
	4	N.C.
blue	5	$\overline{\text{Direction}}$ ¹
red	6	N.C.
violet	7	N.C.
white ³	8	DC 5/ 10 - 30 V
	9	N.C.
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	0 V-signal output ²

¹ Direction: +U_B or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

² Connected with 0 V in the encoder.
Use this output to lay Direction on logical "0" if required.

³ use only thin wires ($\varnothing = 0.14$ mm)

ELECTRICAL CONNECTIONS

M23 connector (Conin), 12 pole / cable
Interface SC, BC

Cable	M23 (Conin)	Signal
brown ²	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
white/green	4	A+
blue	5	$\overline{\text{Direction}}$ ¹
red/blue	6	B+
brawn/green	7	A-
white ²	8	DC 5/10 - 30 V
grey/pink	9	B-
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	Sense

¹ $\overline{\text{Direction}}$: +U_B or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

² use only thin wires ($\varnothing = 0.14$ mm)

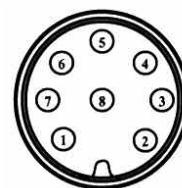
TECHNICAL DATASHEET

Absolute Encoders AC 58 - BiSS / SSI

ELECTRICAL CONNECTIONS

M12 connector, 8 pole

Colour	Pin	Signal
white	1	DC 10 - 30 V
brown	2	0 V
	3	N.C.
green	4	$\overline{\text{Clock}}$
pink	5	Data
yellow	6	Clock
blue	7	$\overline{\text{Direction}}^1$
grey	8	Data



View on
connector

¹ Direction: + U_B or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

CONNECTION



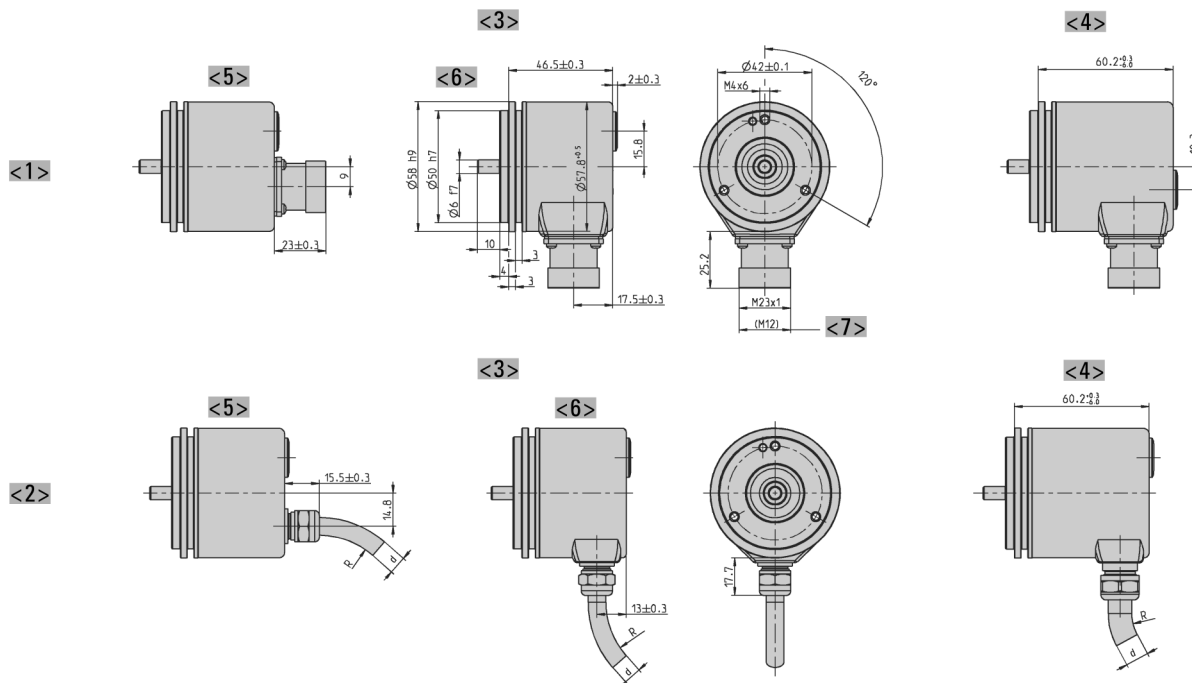
M12, View on connector

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DIMENSIONED DRAWINGS

Synchro flange "S"



- <1> Connection M23 (Conin)
- <2> Connection cable
- <3> Interface: BiSS, SSI, ST-Parallel
- <4> Interface: MT-Parallel (only with cable), Fieldbus, SSI-P
- <5> axial
- <6> radial
- <7> Value in brackets alternative at SSI

Cable bending radius R for flexible installation $\geq 15 \times$ cable diameter
 Cable bending radius R for fixed installation $\geq 7.5 \times$ cable diameter
 Cable Ø d BiSS/SSI/SSI-P: $7,1^{+1,2}$
 Cable Ø d ST-P: $7,8^{+0,9}$
 Cable Ø d MT-P: $9,3^{+1,3}$
 Cable Ø d Fieldbus: $7,1^{+1,2}$

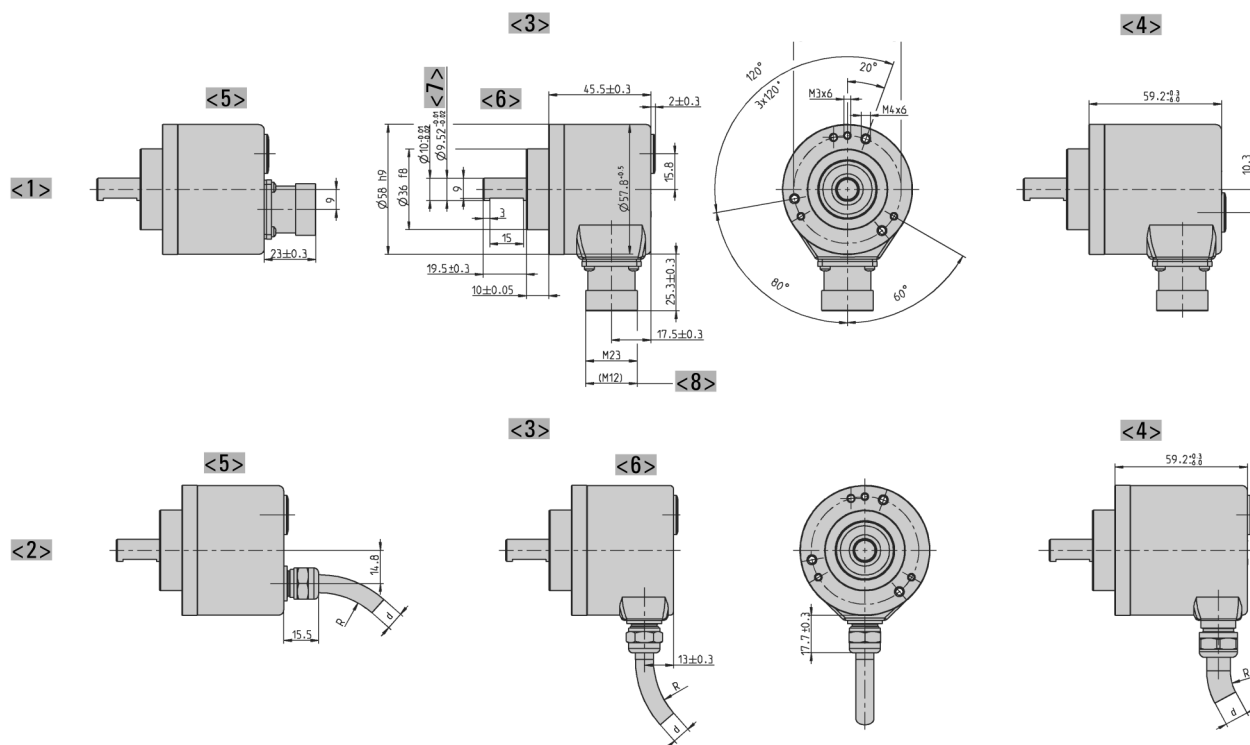
Dimensions in mm

TECHNICAL DATASHEET

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DIMENSIONED DRAWINGS (continued)

Clamping flange "K"



<1> Connection M23 (Conin)

<2> Connection cable

<3> Interface: BiSS, SSI, ST-Parallel

<4> Interface: MT-Parallel (only with cable), Fieldbus, SSI-P

<5> axial

<6> radial

<7> alternative

<8> Value in brackets alternative at SSI

Cable bending radius R for flexible installation $\geq 15 \times$ cable diameter

Cable bending radius R for fixed installation $\geq 7.5 \times$ cable diameter

Cable Ø d BiSS/SSI/SSI-P: $7,1^{+1,2}$

Cable Ø d ST-P: $7,8^{+0,9}$

Cable Ø d MT-P: $9,3^{+1,3}$

Cable Ø d Fieldbus: $7,1^{+1,2}$

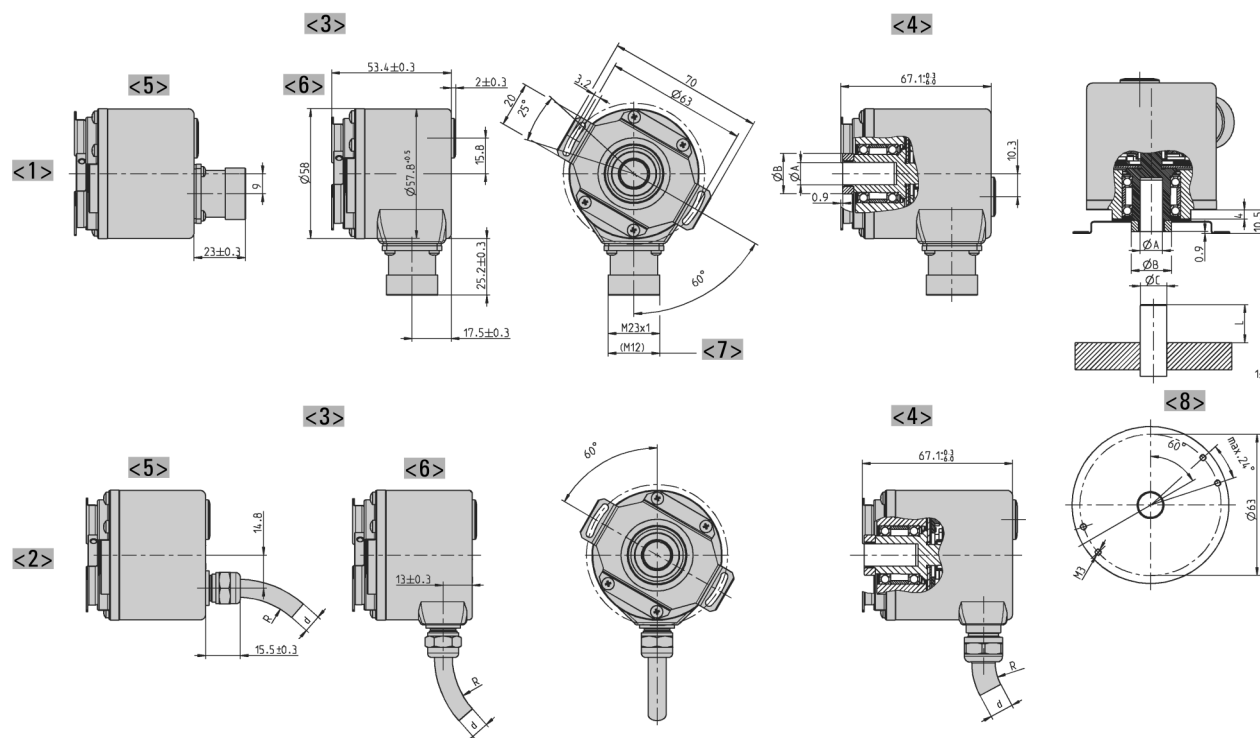
Dimensions in mm

TECHNICAL DATASHEET

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DIMENSIONED DRAWINGS (continued)

Hollow shaft "F"



	Dim.				Unit
Hollow shaft Ø A	10 ^{+0.012}	12 ^{+0.012}	9,52 ^{+0.012}	12,7 ^{+0.012}	mm
Connecting shaft Ø C	10 _{g7}	12 _{g7}	9,52 _{g7}	12,7 _{g7}	mm
Clamping ring Ø B	18	20	18	22	mm
L _{min}	15	18	15	18	mm
L _{max}	20	20	20	20	mm
Shaft code	"2"	"7"	"6"	"E"	

L = Inside length of connection shaft

- <1> Connection M23 (Conin)
 - <2> Connection cable
 - <3> Interface: BiSS, SSI, ST-Parallel
 - <4> Interface: MT-Parallel (only with cable), Fieldbus, SSI-P
 - <5> axial
 - <6> radial
 - <7> Value in brackets alternative at SSI
 - <8> Customer side
- Cable bending radius R for flexible installation $\geq 15 \times$ cable diameter
 Cable bending radius R for fixed installation $\geq 7.5 \times$ cable diameter
 Cable Ø d BiSS/SSI/SSI-P: 7,1^{+1,2}
 Cable Ø d ST-P: 7,8^{+0,9}
 Cable Ø d MT-P: 9,3^{+1,3}
 Cable Ø d Fieldbus: 7,1^{+1,2}

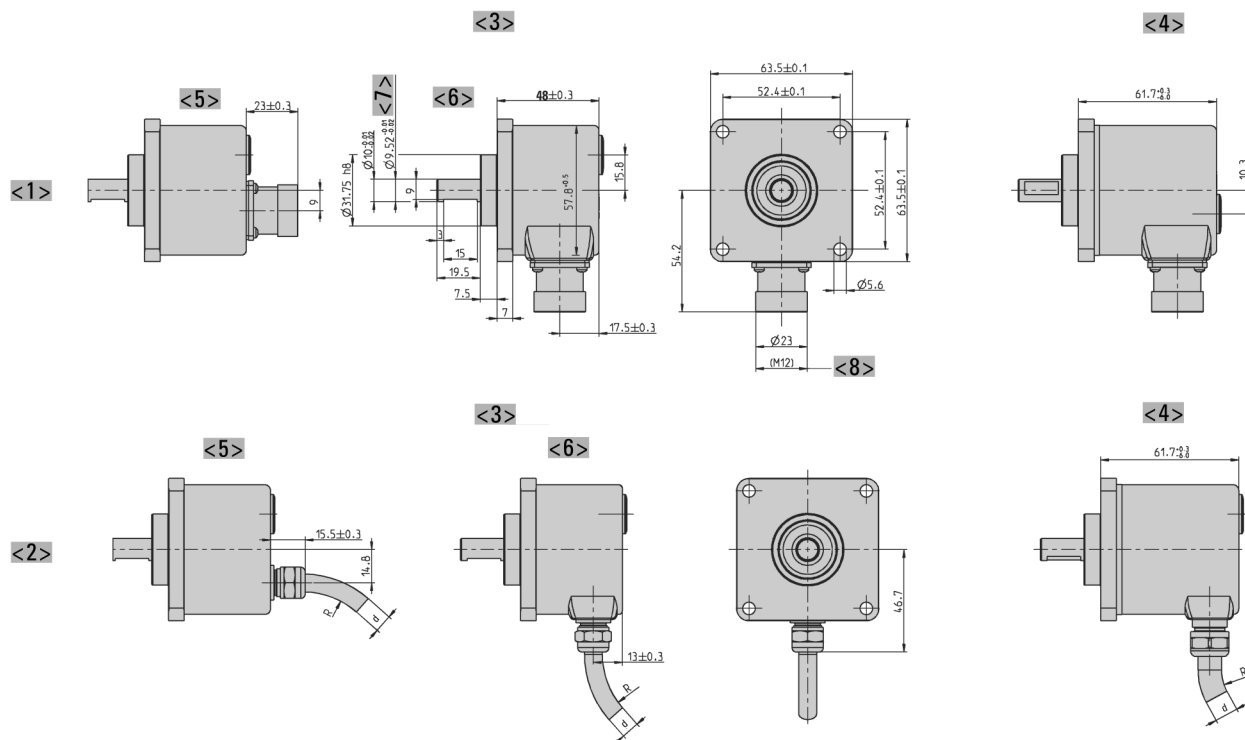
Dimensions in mm

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DIMENSIONED DRAWINGS (continued)

Square flange "Q"



- <1> Connection M23 (Conin)
- <2> Connection cable
- <3> Interface: BiSS, SSI, ST-Parallel
- <4> Interface: MT-Parallel (only with cable), Fieldbus, SSI-P
- <5> axial
- <6> radial
- <7> alternative

- <8> Value in brackets alternative at SSI
- Cable bending radius R for flexible installation $\geq 15 \times$ cable diameter
- Cable bending radius R for fixed installation $\geq 7.5 \times$ cable diameter
- Cable $\varnothing$ d BiSS/SSI/SSI-P: $7,1^{+1,2}$
- Cable $\varnothing$ d ST-P: $7,8^{+0,9}$
- Cable $\varnothing$ d MT-P: $9,3^{+1,3}$
- Cable $\varnothing$ d Fieldbus: $7,1^{+1,2}$

Dimensions in mm

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ORDERING INFORMATION

Type	Resolution ^{1,2}	Supply voltage ³	Flange, Protection, Shaft ^{4,8}	Interface ^{5,6}	Connection ⁷
☐		☐	☐	☐	☐
AC58	0010 10 Bit ST 0012 12 Bit ST 0013 13 Bit ST 0014 14 Bit ST 0017 17 Bit ST 0360 360 increments ST 0720 720 increments ST 1212 12 Bit MT + 12 Bit ST 1213 12 Bit MT + 13 Bit ST 1214 12 Bit MT + 14 Bit ST (BiSS) 1217 12 Bit MT + 17 Bit ST (BiSS) higher resolution on request	A DC 5 V E DC 10 - 30 V	S.41 Synchro, IP64, 6 mm S.71 Synchro, IP67, 6 mm K.42 Clamping, IP64, 10 mm K.46 Clamping, IP64, 9.52 mm K.72 Clamping, IP67, 10 mm K.76 Clamping, IP67, 9.52 mm F.46 Spring tether, IP64, hubshaft 9.52 mm, mounting with clamping ring front F.42 Spring tether, IP64, hubshaft 10 mm, mounting with clamping ring front F.47 Spring tether, IP64, hubshaft 12 mm, mounting with clamping ring front Q.46 Square, IP64, 9.52 mm Q.42 Square, IP64, 10 mm Q.76 Square, IP67, 9.52 mm Q.72 Square, IP67, 10 mm	BI BiSS BC BiSS (+SinCos 1Vpp) SB SSI binary SG SSI Gray SC SSI Gray (+SinCos 1Vpp)	A Cable, axial B Cable, radial C M23 connector (Conin), 12 pole, axial, cw D M23 connector (Conin), 12 pole, radial, cw G M23 connector (Conin), 12 pole, axial, ccw H M23 connector (Conin), 12 pole, radial, ccw 7 M12 connector, 8 pole, axial 8 M12 connector, 8 pole, radial

¹ Resolution 360 increments ST with Offset 76 (value range 76...435)

² Resolution 720 increments ST with Offset 152 (value range 152...871)

³ Max. cable length for DC 5 V: 10 m

⁴ Protection class IP67 not available in combination with preset key and LED display

⁵ Interface BiSS (+SinCos 1Vpp): not with connection "7" and "8" (M12)

⁶ Interface SSI Gray (+SinCos 1Vpp): not with connection "7" and "8" (M12)

⁷ Connection code "7" and "8" (M12) with square flange only for IP64 and 10x19,5 mm shaft

⁸ IP67 on cover with connector only if IP67 mating connector mounted properly.

Preferably available versions are printed in bold type.

ORDERING INFORMATION

Selection of cable length

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

Code	Cable length
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

TECHNICAL DATASHEET

Absolute Encoders AC 58 - BiSS / SSI Accessories

FLEXIBLE COUPLINGS



Bellows coupling



Disk coupling



Helical coupling



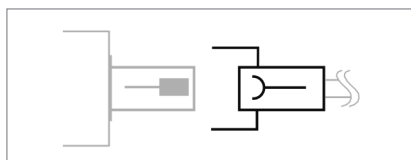
Isolated disk coupling

		Ordering code
Bellows coupling	10 mm / 10 mm	3 520 037
Bellows coupling	6 mm / 6 mm	3 520 068
Bellows coupling	8 mm / 10 mm	3 520 077
Disk coupling	6 mm / 6 mm	0 070 663
Helical coupling 19/28	5 mm / 6 mm	3 520 035
Helical coupling 19/28	6 mm / 6 mm	0 070 653
Helical coupling 19/28	6 mm / 6.35 mm	3 520 051
Helical coupling 25/32	6 mm / 9.53 mm	3 520 052
Helical coupling 25/32	6 mm / 10 mm	3 520 066
Helical coupling 25/32	10 mm / 12 mm	3 520 065
Helical coupling 25/32	10 mm / 10 mm	3 520 074
Isolated disk coupling	6 mm / 6 mm	3 520 081
Isolated disk coupling	6 mm / 10 mm	3 520 082
Isolated disk coupling	10 mm / 10 mm	3 520 088

MOUNTING

	Ordering code
Clamping eccentric, For M4 (set of three)	1 522 300
Clamping eccentric for synchro flange, d6,5 for M3 (set of three)	0 070 655
Clamping eccentric for synchro flange, d9 for M3 (set of three)	0 070 657
Fastening angle (plastic), for clamping flange RI 58, AC 58 (fastening material included)	1 522 329
Mounting bell (plastic), for synchro flange RI 58, AC 58 (clamping eccentric and fastening material included)	1 522 330
Square flange adapter 58 x 58 mm, for clamping flange RI 58, AC 58 (fastening material included)	1 522 326
Square flange adapter 80 x 80 mm, for clamping flange RI 58, AC 58 (fastening material included)	1 522 327
Synchro flange adapter , for clamping flange RI 58, AC 58 (fastening material included)	1 522 328
Torque support	1 531 188

CONNECTORS

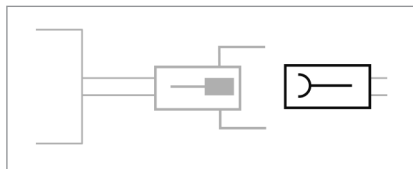


Connector (socket) matching with encoder connector	Ordering code
M23 (Conin), 12 pole, PG9, cw, mating connector for connection C/D/-I	3 539 202

TECHNICAL DATASHEET

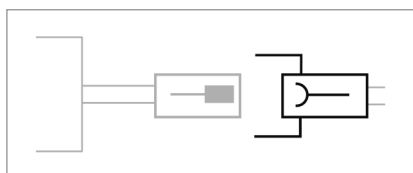
Absolute Encoders AC 58 - BiSS / SSI Accessories

CONNECTORS



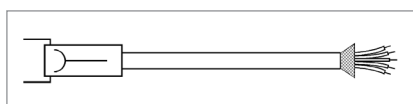
Coupling (socket) matching with encoder cable with connector	Ordering code
M23 (Conin), 12 pole, cw, mating connector for connection -C (cable plug 3 539 186)	3 539 187

CONNECTORS



Connector (socket) matching with encoder cable with connector	Ordering code
M23 (Conin), 12 pole, ccw, mating connector for connection G/H/-D/-H	3 539 229

CONNECTING CABLES



Connecting cables with plug (socket) on one end	Ordering code
M12, 8 pole, PUR cable, mating connector for connection 7/8, 3 m	1 565 329
M12, 8 pole, PUR cable, mating connector for connection 7/8, 5 m	1 565 330
M12, 8 pole, PUR cable, mating connector for connection 7/8, 10 m	1 565 331
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 3 m	1 542 003
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 5 m	1 542 004
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 10 m	1 542 005
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 15 m	1 542 006
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 20 m	1 542 007
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 25 m	1 542 008
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 30 m	1 542 009
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 40 m	1 542 026
M23 (Conin), 12 pole, TPE cable, cw, mating connector for connection C/D, 50 m	1 542 027
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 3 m	1 542 010
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 5 m	1 542 011
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 10 m	1 542 012
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 15 m	1 542 013
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 20 m	1 542 014

TECHNICAL DATASHEET

Absolute Encoders AC 58 - BiSS / SSI Accessories

CONNECTING CABLES (continued)

Connecting cables with plug (socket) on one end	Ordering code
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 25 m	1 542 015
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 30 m	1 542 016
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 40 m	1 542 028
M23 (Conin), 12 pole, TPE cable, ccw, mating connector for connection G/H, 50 m	1 542 029

CONNECTING CABLES

Cable not made up with connectors	Ordering code
TPE cable, 12-core + screen	3 280 220 + length

DISPLAYS

	Ordering code
Position indicator Signo-SSI	0 727 111